

LB/DON/10/09

141

**IP MULTIMEDIA SUBSYSTEM (IMS)  
IMPLEMENTATION FOR  
DIALOG TELEKOM**

**LIBRARY  
UNIVERSITY OF MORATUWA, SRI LANKA  
MORATUWA**



University of Moratuwa, Sri Lanka.  
Electronic Theses & Dissertations  
[www.lib.mrt.ac.lk](http://www.lib.mrt.ac.lk)

**MASTER OF BUSINESS ADMINISTRATION**

**IN**

**MANAGEMENT OF TECHNOLOGY**

I.B.L.Kumara

MBA/MOT06/9026

Department of Management of Technology

University of Moratuwa

December 2008

University of Moratuwa



92406

65 "08"

62:65 (043)

TH

92406

92406

# **IP MULTIMEDIA SUBSYSTEM (IMS) IMPLEMENTATION FOR DIALOG TELEKOM**

**By**



**I.B. Lalith Kumara**  
University of Moratuwa, Sri Lanka.  
Electronic Theses & Dissertations  
[www.lib.mrt.ac.lk](http://www.lib.mrt.ac.lk)

Supervised by

**Mr. Kithsiri Samarasinghe**

The Dissertation was submitted to the Department of Management of Technology of the University of Moratuwa in partial fulfillment of the requirement for the Degree of Master of Business Administration.

Department of Management of Technology

University of Moratuwa

December 2008

## DECLARATION

I certify that this thesis does not incorporate any material from previously submitted thesis or publications without proper acknowledgement. Wherever applicable, the required references are made available. I hereby kindly request from Department of Management of Technology, not to make this thesis available for references due to the nature of confidential information related to Dialog Telekom.

.....  
Signature of the Researcher  
.....  
Date  
.....  
University of Moratuwa, Sri Lanka  
Electronic Theses & Dissertations  
www.lib.mrt.ac.lk

I assure that above details are true and accurate to the best of my knowledge.

.....  
Supervisor  
A. T. L. K. Samarasinghe  
Head  
Department of Electronic & Telecommunication Engineering  
University of Moratuwa, Sri Lanka  
.....  
Date  
.....

## ACKNOWLEDGEMENT

I would like to express my sincere gratitude to my research supervisor Mr. Kithsiri Samarasinghe for his untiring effort in helping me to continue with my research until the end. I feel extremely lucky to have had a research supervisor like him, having benefited immensely by his vast experience and knowledge during my research. I really appreciate his support extended to me by always keeping himself accessible and available despite his extremely busy schedule. Mr. Samarasinghe's constant support and guidance enabled me to complete my research on time.

My sincere appreciation goes to all my lecturers for their guidance throughout my MBA study and helping me in numerous ways to achieve my objectives by encouraging me all the way. Also I wish to extend my sincere appreciation to all staff at Department of Management of Technology at University of Moratuwa for helping me in numerous ways.

I take this opportunity to extend my sincere appreciation for all who supported in numerous ways by filling the questionnaire and giving their valuable feedback in timely manner. My sincere gratitude to Dialog staff, especially to Chief Technology Officer, Mr. Pradeep De Almedia, and Group Chief Corporate Officer, Mr. Mothilal De Silva, and Project Manager and Technical Project Leader of IMS in house trial implementation team for their dedication and support extended to me for the timely completion of my thesis.

## ABSTRACT

Sri-Lanka telecommunication sector consists of four licensed fixed line service providers and five mobile service providers. As per statistics published by Sri-Lanka Telecommunication Regulatory Commission (TRCSL), the mobile penetration level is reaching closer to 40% of the population, and the competition in this sector is intensifying day by day due to increased adoption of technologies, mergers, acquisitions and new entrants.

Dialog Telekom as the market leader is fighting an intense battle in a highly competitive environment and the company needs creative and innovative solutions to retain its market leadership position.

In a highly competitive market with reducing voice revenue, new value added services are the key business drivers for new revenue streams and to sustain the competitive advantages. IP multimedia Subsystem (IMS) is becoming increasingly popular as the architecture of choice for delivering multimedia based new value added services and promises to deliver many strategic advantages to service providers to remain competitive in a highly dynamic and competitive environment.

In light of the above, this research is focused on identifying strategic advantages of IMS to Dialog Telekom, user acceptance of IMS services, and potential barriers for implementation and finally formulating strategies for the implementation of IMS.

The literature review revealed that IMS can deliver many strategic advantages such as new features, capital and operational expenditure reduction, reduced time to market for new features and converged service offering etc. The results of the user acceptance survey revealed that user acceptance of IMS related new value added services are at a high level. Further, it was revealed that worldwide, there are many ongoing IMS trials and early adopters of IMS claim that IMS would enable operators to rapidly create and introduce compelling new multimedia services that will drive up service revenues by reducing churn.

Interview with senior management team revealed that Dialog Telekom has a positive attitude towards IMS, and it is the reason behind the recently concluded IMS trial. The interview with IMS trial implementation team provided an opportunity to identify potential barriers for implementation – issues related to technology, financial, regulatory, and marketing and human resources.

The financial analysis revealed that long term benefits of IMS outweigh the cost of implementation, when IMS implementation is considered over a horizon of at least five years.

Based on the feedback obtained from the user acceptance survey, literature survey, interview with Dialog Telekom staff and financial analysis, step wise implementation is recommended with a minimum initial investment, focusing on fixed domain first and subsequently on mobile domain. In the final stage it is recommended to focus on delivering converged services. The strategies for implementation were formulated based on the above approach.



University of Moratuwa, Sri Lanka.  
Electronic Theses & Dissertations  
[www.lib.mrt.ac.lk](http://www.lib.mrt.ac.lk)

# TABLE OF CONTENTS

<b>Declaration .....</b>	<b>i</b>
<b>Acknowledgement.....</b>	<b>ii</b>
<b>Abstract .....</b>	<b>iii</b>
<b>Table of Contents.....</b>	<b>v</b>
<b>List of Figures .....</b>	<b>ix</b>
<b>List of Tables .....</b>	<b>xi</b>
<b>Abbreviations .....</b>	<b>xii</b>

## Chapter 1: Introduction

1.1 Overview of World Telecommunication Sector .....	1
1.1.1 Technology Evolution .....	1
1.1.2 Strategic Advantages Of IMS.....	4
1.2 Overview of Sri-Lankan Telecommunication Sector .....	5
1.2.1 Overview of Mobile Communication Sector.....	6
1.3 Background to the Problem.....	7
1.3.1 Reducing Technology Gap.....	7
1.3.2 Competition and New Entrant .....	8
1.3.3 Inflexible Old Architecture.....	9
1.3.4 Changing End User Requirements.....	9
1.3.5 Threat From Internet World.....	9
1.4 Research Problem .....	10
1.4.1 Research Topic and Objectives .....	10
1.5 Methodology of Study .....	11
1.6 Literature Survey .....	12
1.7 Expected Results of the Study .....	12
1.8 Significance of the Study .....	13

## Chapter 2: Literature Review

2.1	Telecommunication Sector Overview.....	14
2.1.1	Telecommunication Sector Growth.....	14
2.1.2	Technology Evolution .....	17
2.1.3	Market Dynamics.....	18
2.2	IP Multimedia Subsystem (IMS) .....	21
2.2.1	What Is IMS.....	21
2.2.2	Organizations Behind Development of IMS .....	22
2.2.3	Features Related to IMS .....	24
2.2.4	Strategic Advantages of IMS.....	25
2.3	Challenges for Service Providers.....	32
2.3.1	Subscriber Churn .....	32
2.3.2	Challenges Due to Industry Transformation.....	33
2.3.3	Challenges from Internet Service Providers.....	36
2.3.4	Reducing Voice ARPU and Focus on New VAS.....	37
2.3.5	Market Demand for New Services –Inflexible Legacy Systems.....	39
2.4	Implementation Barriers.....	39
2.5	IMS Deployments.....	40
2.6	Applicability to Sri Lankan Context.....	42
2.7	Research Model for User Acceptance.....	50
2.7.1	Model for Studying the User Acceptance of Mobile Services .....	51

## Chapter 3: Methodology of Study

3.1	Introduction.....	56
3.2	Methodology .....	57
3.2.1	Methodology for Objective 1.....	57
3.2.2	Methodology for Objective 2.....	58
3.2.3	Methodology for Objective 3.....	59
3.3	Conceptual Model.....	59
3.3.1	Conceptual Model for User Acceptance.....	60
3.3.2	Conceptual Model for Identifying Dialog Telekom Perception on IMS.....	62
3.3.3	Conceptual Model for Identifying Barriers .....	62



3.4	Operationalization of Parameters.....	65
3.5	Data Collection .....	68
3.6	Sample Size Determination.....	68
3.7	Limitations of Study .....	71

#### **Chapter 4: Analysis and Discussion of Results**

4.1	Introduction.....	72
4.2	Method of Analysis.....	73
4.3	Analysis of User Acceptance of New Value Added Services .....	76
4.3.1	Analysis of Perceived Ease Of Use .....	76
4.3.2	Analysis of Perceived Value.....	77
4.3.3	Analysis of Trust.....	78
4.3.4	Analysis of Perceived Ease of Adoption .....	79
4.4	Overall User Acceptance .....	80
4.5	Discussion on Interview Findings.....	80
4.5.1	Dialog Telekom Perception on IMS .....	81
4.5.2	Identification of Potential Barriers For IMS Implementation .....	88
4.5.3	Financial Analysis .....	93
4.6	Strategies for Implementation .....	96

#### **Chapter 5: Conclusions and Recommendations**

5.1	Conclusions.....	104
5.2	Recommendations.....	106
5.3	Directions for Further Research.....	107

<b>List of References.....</b>	<b>108</b>
--------------------------------	------------

<b>Appendix 1: Questionnaire Sinhala .....</b>	<b>115</b>
--	------------

<b>Appendix 2: Questionnaire Tamil.....</b>	<b>124</b>
---	------------

<b>Appendix 3: Questionnaire English .....</b>	<b>133</b>
--	------------

<b>Appendix 4: Questionnaire for Identifying Potential Barriers .....</b>	<b>142</b>
<b>Appendix 5: Questionnaire to Identify Dialog Telekom Perception on IMS .....</b>	<b>143</b>
<b>Appendix 6: Basic Data Presentation from User Questionnaire.....</b>	<b>145</b>



University of Moratuwa, Sri Lanka.  
Electronic Theses & Dissertations  
[www.lib.mrt.ac.lk](http://www.lib.mrt.ac.lk)

## LIST OF FIGURES

Figure 1: Total Wireless Subscriber Base in Different Regions (from Q4-2004 up to Q3 2008) .....	1
Figure 2: Evolution of Access Technology .....	2
Figure 3 : Mobile Handset Evolution .....	3
Figure 4: High Level IMS Architecture.....	3
Figure 5: Growth of Worldwide Total Number of Mobile, Fixed & Internet Subscriptions .....	14
Figure 6: Mobile Penetration (Mobile Phone Subscribers per Hundred Population) in Different Countries of Asian Region, Respectively In 2001 and 2006. ....	16
Figure 7: Wireless Network Evolution .....	17
Figure 8: Evolution of Mobile Handsets .....	18
Figure 9: Overview of Business Drivers (Ericsson) .....	19
Figure 10: Current Vertical Approach Vs IMS Horizontal Architecture .....	26
Figure 11: Comparison of Current Mobile Network Architecture Vs IMS Architecture .....	28
Figure 12: Regional Churn Evolution (Q1 2006-Q1 2007).....	33
Figure 13: Service Portfolios of Key Internet Service Providers .....	36
Figure 14: Non-Voice ARPU and Non-Voice Services As A Percentage of Total ARPU in CEE, 2002–12. (Analysys Mason, 2007).....	38
Figure 15: Mobile Data Revenues on the Rise .....	38
Figure 16: Selected IMS Contracts.....	41
Figure 17: Dialog's Blended ARPU.....	44
Figure 18: Dialog Telekom Financial Performance .....	46
Figure 19: Average Monthly Prepaid Mobile Cost for a Low User.....	47
Figure 20: Average Monthly Prepaid Mobile Cost for a Medium User.....	47
Figure 21: Average Monthly Prepaid Mobile Cost for a High User .....	48
Figure 22: Average Monthly Postpaid Mobile Cost for a Low User .....	48
Figure 23: Average Monthly Postpaid Mobile Cost for a Medium User .....	48
Figure 24: Average Monthly Postpaid Mobile Cost for a High User.....	49
Figure 25 : Technology Acceptance Model (Davis, 1989).....	51
Figure 26: Technology Acceptance Model for Mobile Services as an Extension to TAM .....	53

Figure 27: Conceptual Framework for Identifying Dialog Telekom Perception on IMS and Its Strategic Advantages .....	62
Figure 28: Conceptual Framework for Identifying Potential Barriers for IMS Implementation.....	63
Figure 29: Diagram of Conceptual Model.....	64
Figure 30: Age Wise Analysis of Postpaid Subscriber Base.....	69
Figure 31: Age Wise Analysis of Prepaid Subscriber Base .....	69
Figure 32: Total Cost Associated with Introduction of New VAS with IMS Vs Legacy (without IMS) .....	96



University of Moratuwa, Sri Lanka.  
Electronic Theses & Dissertations  
[www.lib.mrt.ac.lk](http://www.lib.mrt.ac.lk)

## LIST OF TABLES

Table 1: Statistical Overview of Telecommunication Sector as At End of 4th Quarter - 2007. (Telecommuincation Regulatory Commission Sri-Lanka, 2008).....	6
Table 2: Growth of Mobile Subscriber Base from 1992 to December, 2007.....	6
Table 3: Standardizing Bodies behind IMS.....	23
Table 4: Major Merger and Acquisition Deals (2001-2004) .....	35
Table 5: Major Merger and Acquisition Deals (2006-2008) .....	35
Table 6 : Research Objectives and Methodologies.....	57
Table 7: Variables, Indicators and Measures for User Acceptance of IMS Services..	66
Table 8: Variables, Indicators and Measures for User Acceptance of IMS Services..	67
Table 9: Age Wise Analysis of Total Subscriber Base.....	70
Table 10: Sampling Table.....	70
Table 11: Number of Questionnaires Distributed in each Medium Vs Number of.....	72
Table 12: Allocation of Weights to Indicators and Measures. ....	74
Table 13: Allocation of Weights to Indicators and Measures. ....	75
Table 14: Mean Value and Variance of Variable “Perceived Ease of Use” .....	76
Table 15: Mean Value and Variance of Variable “Perceived Values” .....	77
Table 16: Mean and Variance of Variable “Trust” .....	78
Table 17: Mean and Variance of Variable “Ease of Adoption” .....	79
Table 18: Overall Mean and Variance Of “User Acceptance of IMS Related Services” .....	80
Table 19: Cost Elements & Average Cost Associated with Value added service Implementation .....	94
Table 20: Cost associated with Development of VAS on IMS platform Vs Legacy Environment .....	95

## ABBREVIATIONS

3G	3 <sup>rd</sup> Generation
3GPP	3 <sup>rd</sup> Generation Partnership Project
3GPP2	3 <sup>rd</sup> Generation Partnership Project 2
4G	4 <sup>th</sup> Generations
AIR	Automatic International Roaming
ARPU	Average Revenue Per User
BT	British Telecom
CAPEX	Capital Expenditure
CDMA	Code Division Multiple Access
CSCF	Call Session Control Function
DTP	Dialog Telekom PLC.
EDGE	Enhance Data for GPRS Evolution
ETSI	European Telecommunications Standards Institute
FMC	Fixed Mobile Convergence
GPRS	General Packet Radio System
GSM	Global System for Mobile
HSDPA	High Speed Downlink Packet Access
HSPA	High Speed Packet Access
HSS	Home Subscriber Service
IETF	Internet Engineering Task Force
IOT	Inter Operability Tests
IMS	Internet Protocol Multimedia Subsystem
IP	Internet Protocol
ITU	International Telecommunication Union
Mbps	Mega bits per second
MIS	Management Information Systems
MGC	Media Gateway Controller
MNP	Mobile Number Portability
MMS	Multi-Media Messaging
OMA	Open Mobile Alliance
OPEX	Operational Expenditure

PLC	Public Limited Company
PoC	Push-To-Talk over Cellular
PM	Project Manager
SIM	Subscriber Identification Module
SIP	Session Initiation Protocol
SMS	Short Messaging Service
SLT	Sri-Lanka Telecom
TAM	Technology Acceptance Model
TISPAN	Telecommunications and Internet converged Services and Protocols for Advanced Networking
TRCSL	Telecommunication Regulatory Commission of Sri-Lanka
TPL	Technical Project Leader
UMTS	Universal Mobile Telephony System
VAS	Value Added Services
VoIP	Voice over Internet Protocol
WAP	Wireless Application Protocol
WCDMA	Wideband Code Division Multiple Access
Wi-MAX	Worldwide Interoperability for Microwave Access



University of Moratuwa, Sri Lanka  
Electronic Theses & Dissertations  
[www.lib.mrt.ac.lk](http://www.lib.mrt.ac.lk)